



# Taking Situation-Based Privacy Decisions: Privacy Assistants Working with Humans

**Nadin KOKCIYAN**  
[nadin.kokciyan@ed.ac.uk](mailto:nadin.kokciyan@ed.ac.uk)

**Pinar YOLUM**  
[p.yolum@uu.nl](mailto:p.yolum@uu.nl)



THE UNIVERSITY  
*of* EDINBURGH



Utrecht  
University

# Privacy in IoT

---

- Internet of Things (IoT) is **large**, **dynamic** and **heterogeneous**.
- IoT devices **collect**, **store** and **process** various types of data.
- Users are handling privacy with IoT devices through **consent**, which creates a **decision load** on the user.

We propose an **agent-based privacy assistant (PAS)** to make decisions in **different situations** with the users.

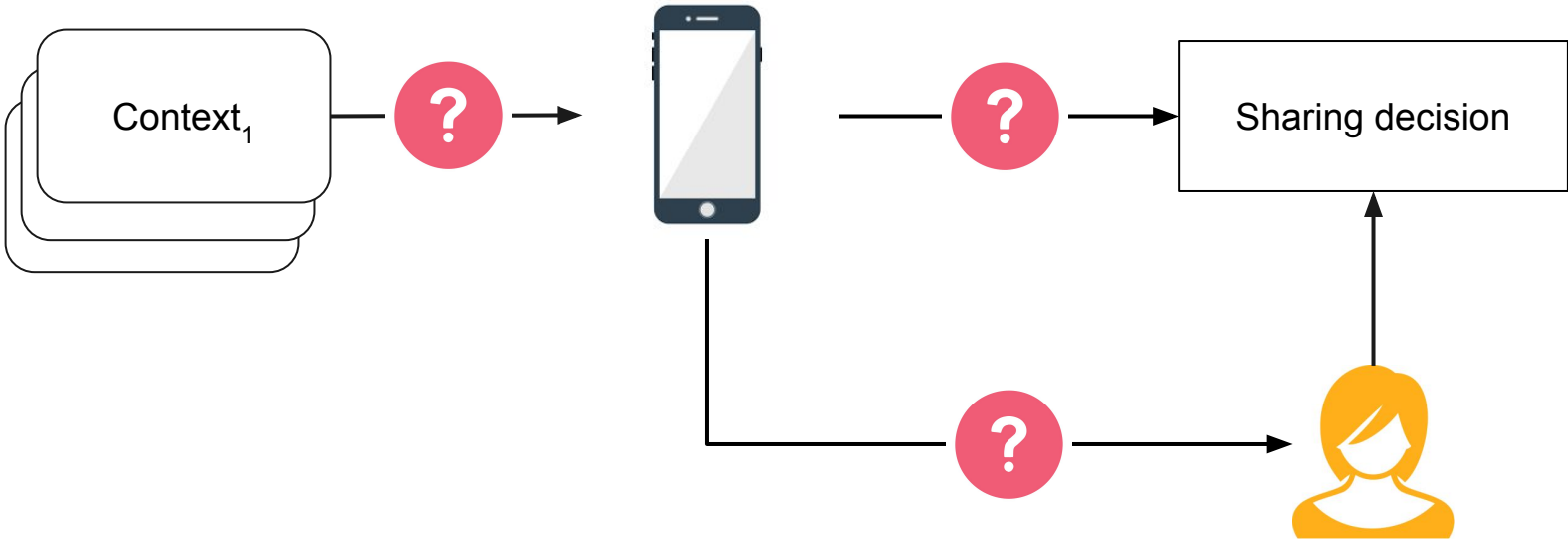
# An Example Privacy Situation

---

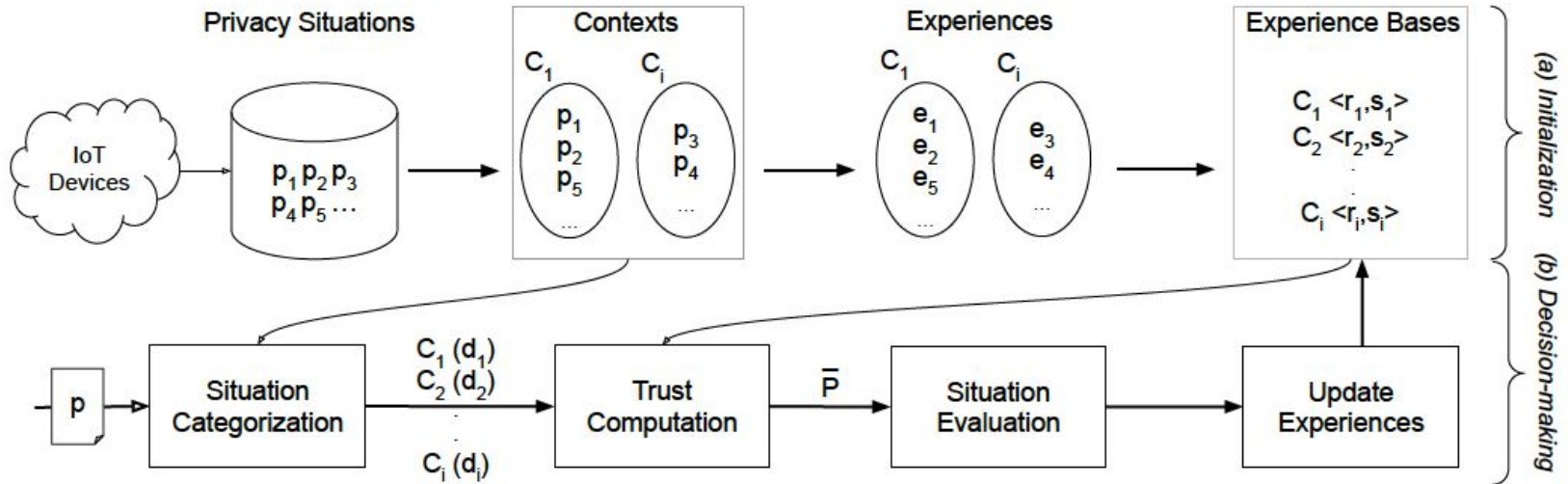


You are at a **department store**. This store has **presence sensors** to detect whether **someone is present**. The store management uses this data to **keep track of when there are few customers** in the shop to determine whether they can **reduce the number of staff** at these times. You are not told **how long the data will be kept**.

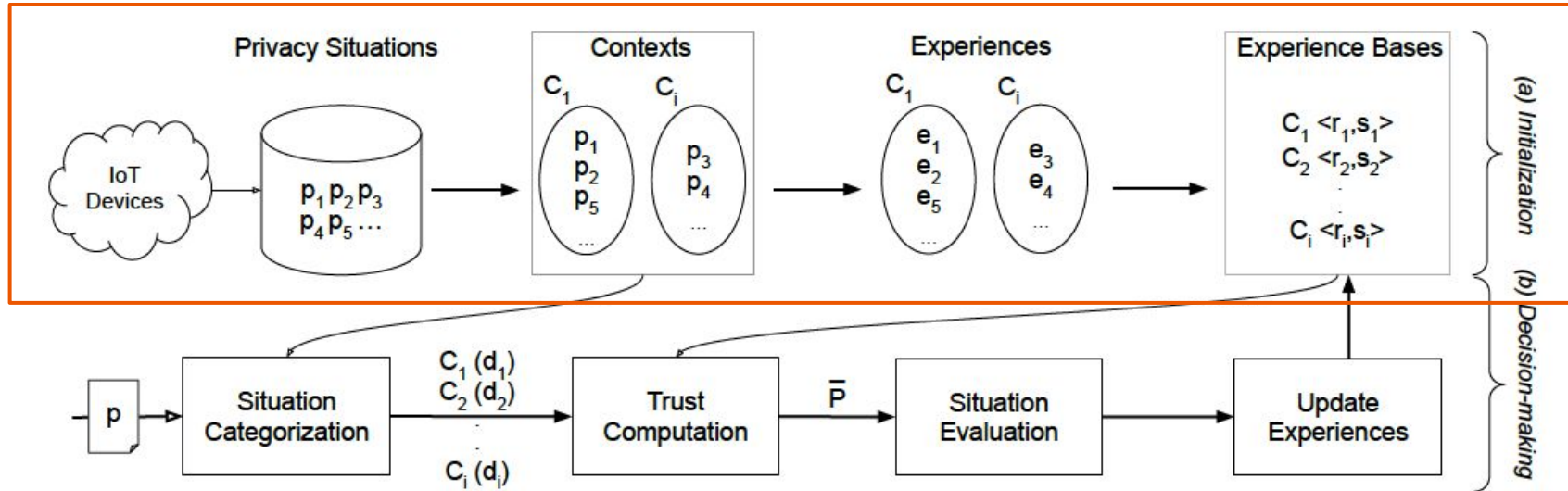
# Major Challenges



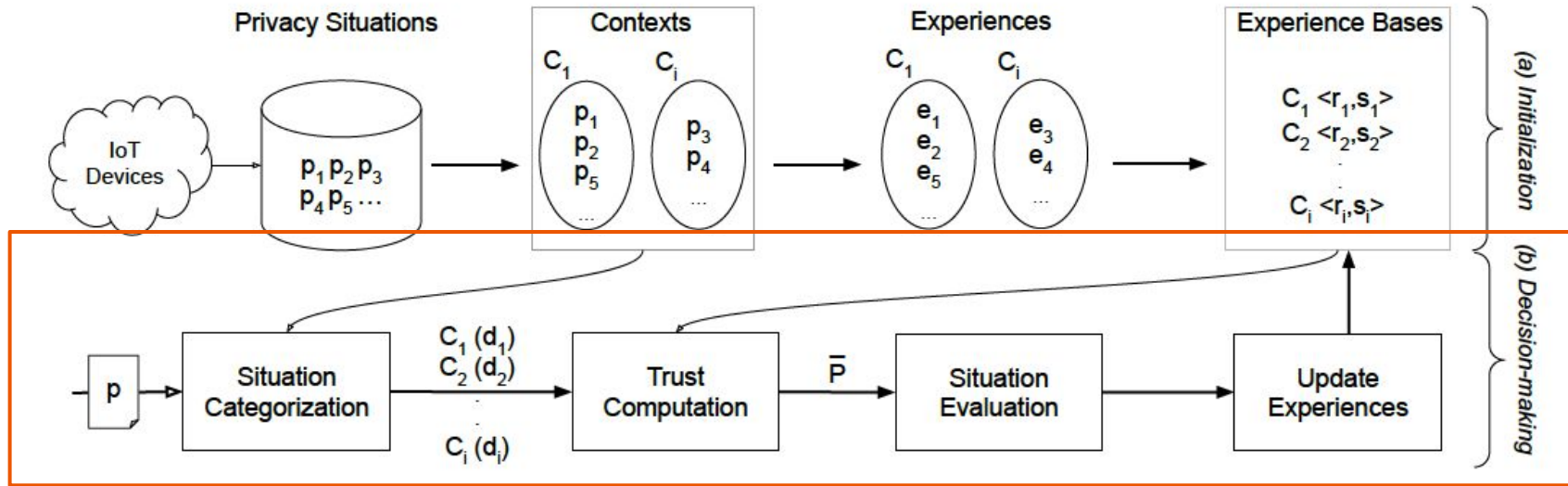
# Situation-based Privacy Model



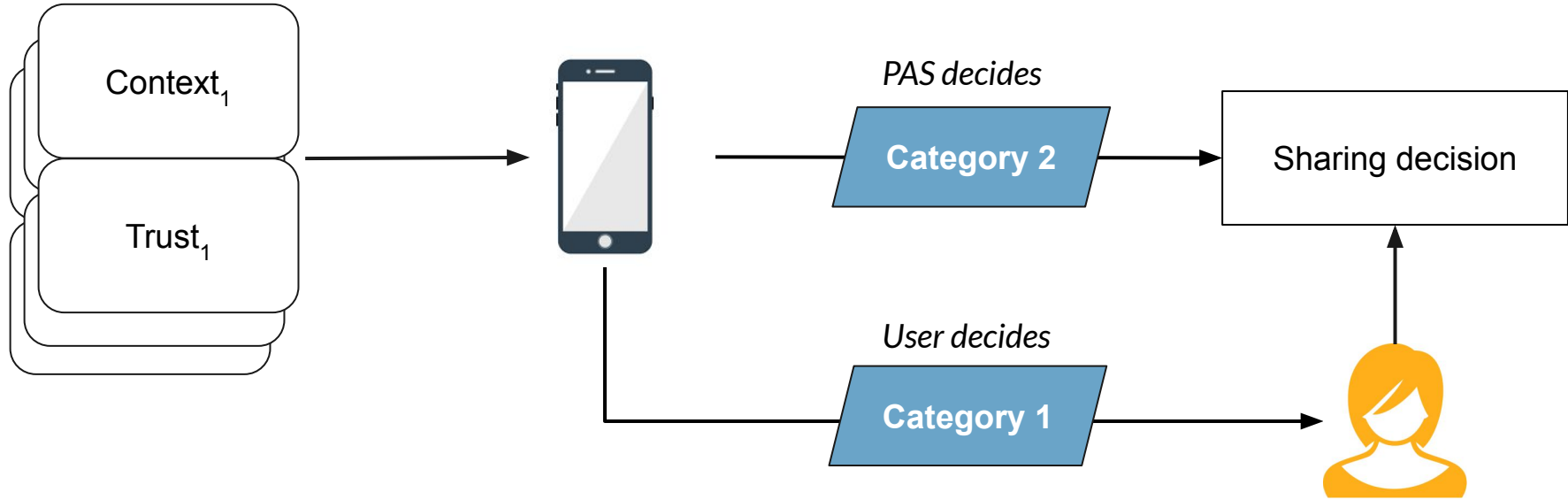
# Situation-based Privacy Model



# Situation-based Privacy Model



# Multi-context Decision-making





# Evaluation

---

## Setup

- A **real-world anonymized dataset** that is collected from users of IoT devices [Naeini et al., 2017].
- Privacy situations are used to **generate context clusters** and to train a **multi-label classifier**.

## Results

- PAS achieves better results when considering **multiple contexts**.
- PAS identifies **ambiguous cases** correctly to delegate to the user.
- PAS can **adapt** model parameters by observing user sharing patterns.

# Conclusion

---

- We proposed an **agent-based privacy assistant (PAS)** to handle interactions with IoT devices while **collaborating with humans**.
- **Semantic relations** among contexts could be used to decide on a specific order to process contexts.
- A **richer human-feedback** could help PAS to personalize better.

# Thank you!

---



**Nadin KOKCIYAN**  
[nadin.kokciyan@ed.ac.uk](mailto:nadin.kokciyan@ed.ac.uk)

**Pinar YOLUM**  
[p.yolum@uu.nl](mailto:p.yolum@uu.nl)

QR Code for our paper:



THE UNIVERSITY  
*of* EDINBURGH

REPHRAIN  
Protecting citizens online



Utrecht  
University



Hybrid  
Intelligence